



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

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MAY 02 1989

MEMORANDUM FOR: Carl H. Berlinger, Chief
Generic Communications Branch

FROM: Roy P. Zimmerman, Acting Director
Division of Reactor Safety and Projects

SUBJECT: POTENTIAL GENERIC ISSUE

Region V has recently identified problems with the installation and testing of auxiliary feedwater pump turbine governors and overspeed trip mechanisms. The attached describes two related conditions. These conditions were discussed with you on April 25, 1989 and included: an inoperable overspeed protection function due to inadequate maintenance and testing at Diablo Canyon; and an inoperable governor and overspeed protective device at Rancho Seco due to an unauthorized vendor modification and post-maintenance test inadequacies on the governor, and degradation and inadequate testing of the overspeed trip device. Region V feels that the similarities of the conditions warrant your consideration for generic applicability.

R. P. Zimmerman, Acting Director
Division of Reactor Safety and Projects

Attachment: As Stated

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Diablo Canyon Unit 2 Failure of the Auxiliary Feedwater Pump Overspeed Trip Actuating Device and the Overspeed Trip Stop Valve (FCV 152)

On February 12, 1989, at 10:45 p.m. PST, the licensee discovered that the overspeed trip device for the turbine driven auxiliary feedwater (A/W) pump 2-1 was inoperable. The pump was declared inoperable and a 72 hour action statement was entered in accordance with Technical Specifications.

The discovery of the inoperable overspeed device was made inadvertently during training of auxiliary operators. The trainees were being taught how to trip and relatch the device. Upon manual tripping, the overspeed device did not cause the overspeed stop valve (FCV 152) to go shut. This was a cold test, steam had not been admitted to the line.

Subsequent maintenance investigation revealed two independent problems. First, the valve FCV 152, a spring-actuated-to-close-valve, did not close even after the latch-open mechanism was physically tripped open. The problem was subsequently determined to be heavy rust and corrosion on the spring-to-close mechanism which inhibited movement of the valve stem assembly. Secondly, the trip mechanism itself did not move sufficiently to unlatch the valve. This was due to corrosion and hardened lubricant on some parts of the assembly. The licensee cleaned and repaired the valve, actuation assembly and trip mechanism. The mechanism was satisfactorily tested and declared operable on February 14, 1989.

The steam driven auxiliary feedwater pump is regulated in speed by a Woodward governor and valve. The vendor technical manual (PG&E document Number DC 663056 Revision 8) contains several warning notes that the turbine device should be protected with a separate overspeed shutdown device should the governor fail. Licensee engineering personnel concluded that the pump would have performed its design function if the governor functioned properly (which it did during functional testing following the event). It remains also true that had the governor not functioned properly the lack of overspeed protection could have resulted in equipment failure.

The licensee had preliminarily concluded that the condition was caused by excessive steam environment in the AFW pump room due to previous problems with steam trap drains and current problems with building heating steam leakage paths.

The licensee's action plan includes:

- o The inspection of Unit 1 for similar conditions (Unit 1 was inspected and tested and found to be satisfactory).
- o Modified testing requirements to increase the testing frequency from every refueling outage to monthly.
- o Perform a review of the overspeed trip mechanism for acceptability.
- o Assess drawing adequacy for the mechanism.
- o Initiate an engineering request to provide a drainage from the FCV 152 spring assembly.
- o Prepare detailed trip mechanism maintenance procedures.

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Three resident inspectors examined the situation and have preliminarily determined that three main problems appear to be involved. First, the licensee had not implemented actions recommended in the vendor technical manual specifically to test the overspeed trip device monthly and to lubricate the device weekly. Secondly, the licensee's corrective work orders lacked specificity and provided mechanics with drawings of a different (later) model of overspeed trip device. Thirdly, the licensee had previously experienced problems with the overspeed trip device in November 1988, during testing after the Unit 2 second refueling outage. This previous occurrence identified the lack of proper drawings for the device but the work order line item to obtain proper drawings had been "N/A'd" by a site engineer.

Rancho Seco Failure of Pump Overspeed Trip Actuating Device

On January 31, 1989, the turbine driven Auxiliary Feedwater Pump experienced an overspeed condition (to 6020 rpm) which resulted in overpressurizing the Auxiliary Feedwater System piping to about 3800 psig, well in excess of the design criteria.

The licensee's investigation of this event identified several contributors.

1. A rebuilt Woodward governor was installed on January 31, 1989, to correct a water contaminated oil situation. The governor had been refurbished by the vendor in 1988. The governor was modified by the vendor in several ways; however, the vendor made an additional modification, not requested by the licensee, to change the control oil pressurization system from bi-directional to uni-directional rotation. Unfortunately, the wrong rotation direction was chosen by the vendor. This governor modification was included among 32 entries, by the vendor, on a listing of changes made to the governor. However, the licensee failed to note this entry during the receipt inspection and dedication processes. This modification resulted in an inability to develop the required control oil pressure and a corresponding inability of the governor to control turbine speed.
2. The mechanical overspeed trip rod spring tension was found to be low, at 20 ft. lbs. instead of the required 30 ft. lbs. tension. This resulted in an observed inconsistency in the actuation of the overspeed trip. This was compounded by a failure to provide for a regular exercising of the overspeed trip mechanism to verify proper mechanism lubrication, adjustment and operation.
3. The licensee's post-maintenance test procedures for testing the governor were inadequate in that several manufacturer recommendations, contained in technical manuals, were ignored, with the result that the licensee's post-maintenance test procedure depended upon the proper operation of the overspeed protective device to protect the system from overpressure and the turbine from overspeed.

The licensee improved their processes for controlling post-maintenance testing and vendor activities, and instituted monthly testing of the overspeed trip device and trip valve to prevent recurrence.

Attachment 2